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AUTHOR Shimizu, Naoji
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ABSTRACT

This study investigated the effectiveness of a natural environment language training procedure that combined the mand-model procedure and the time delay procedure for the acquisition of noun signs and for the spontaneous use of the signs acquired. One autistic boy, aged 5 years, 4 months with no verbal imitation skills and few movement imitation skills, was taught to shape 16 imitation skills and few movement imitation skills, was taught to shape 16 noun signs by using a simultaneous communication method. The study's results indicate the following changes as training progressed: the child's spontaneous behavior increased, while responses to the teacher's mands decreased. The rate of various response modes changed, with the rate of response with sign alone being high at the beginning of the training and finger-pointing with vocalization being high near the end of the training. The rate of the child's correct signs increased. Interaction patterns between the child and the teacher shifted toward increasing give and take behaviors. The child learned to imitate orally all the Japanese vowels, some diphthongs, and some three-connected vowels. In conclusion, the teaching strategies used showed considerable promise for the acquisition and acceleration of the spontaneous use of noun signs acquired. An abstract is provided in Japanese. (JDD)

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SIGN LANGUAGE TRAINING FOR CHILDREN WITH DEVELOPMENTAL RETARDATION IN SPEECH*

Naoji SHIMIZU**

Key words: language-delayed children, sign language, behavior analysis, mand-model procedure, time delay procedure

It is generally recognized that the development of language in normal children progresses naturally through interactions with persons in the children's natural environments. However, for children with deficiencies in language development, such as severely and profoundly mentally retarded and autistic children, it is not enough to expose them to natural language speaking environments. In those cases, special training for language acquisition and improvement should be conducted in adequately structured settings.

A large amount of research has been done on language training in children who have never exhibited meaningful expressive language, and many language training programs have been developed (e.g., Bricker & Bricker, 1970; Guess, Sailor, & Baer, 1978; Stremel & Waryas, 1974).

During the past twenty years, language training for language-delayed children, based on the principles of behavior analysis, has been carried out in structured one-to-one teaching situations, focused on the acquisition of oral language skills. Such operant speech training has been used successfully to teach these children the skills necessary for speech (e.g., Lovaas, Berberich, Perloff, & Schaeffer, 1966; Risley & Wolf, 1967). Some of these studies have, however, found that operant training was very time-consuming (Lovaas, Koegel, Simmons, & Long, 1973) and that response generalization to the world outside the training room was difficult to obtain (Harris, 1975).

As a result, on the one hand, the conditions that facilitate response generalization and spontaneous use of acquired skills have been investigated. Consequently, some techniques for language training were developed that used the interactions between an adult and a child that occur naturally in daily unstructured situations. These natural environment language training procedures are, for example, an incidental teaching procedure (Hart & Risley, 1968, 1974, 1975, 1980), a mand-model procedure (Rogers-Warren & Warren, 1980), and a time delay procedure (Halle, Marshall, & Spradlin, 1979).

On the other hand, since the beginning of 1970s, it has been maintained that, as an alternative to the training of oral language skills, a variety of nonoral systems of language, such as sign language, Bliss symbols, and communication boards, should be available for teaching children communication. Among these systems, sign language is the most familiar, and there is evidence that sign language may be easier to learn than speech for some nonverbal language-delayed children (e.g., Salvin, Routh, Forster, & Loveyoy, 1977).

The purpose of the present study was to investigate the effectiveness of a natural environment language training procedure that combined the mand-model procedure and the time delay procedure for the acquisiton of noun signs and for the spontaneous use of the signs acquired.

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METHOD

One autistic boy participated in this study. His CA was 5 years 4 months at the time of program entry. He had many inappropriate behaviors including hyperactivity, self-stimulatory behavior such as fluttering his fingers in front of his face, and self-injurious behavior such as biting his hand around the middle part between the thumb and the forefinger. Although vocal noisemaking was frequent, he was not able to request preferred items with meaningful vocal sounds.

The pre-training assessment indicated that he had neither verbal imitation skills nor movement imitation skills except "putting his hands straight out in front of him" and "raising his hands straight up". The DQ derived from the Tsumori mental development questionnaire was 38 at the age of five.

All training sessions took place on a one-to-one basis in a quiet training room (4m × 3m), in order to control the child's hyperactive behaviors. During the training session, the stimulus materials that the child might wish to play with were placed on the table or floor arbitrarily.

In this pseudo-natural environment, the occasions for learning signs were initiated by the child himself incidentally. If the child wanted to use these materials, he had to request them from the teacher. When the child initiated the incidental teaching episode, the teacher asked what the child needed and taught him the sign in response to the child's behavior.

The teacher's interventions were as follows:

a) When the child made a correct sign in looking toward the teacher: The teacher simultaneously presented the spoken word corresponding to the sign that the child had made and gave him the material contingently with praise.

b) When the child made the sign while looking at the material: The teacher manded the child to describe the material ("What do you want? Tell me what this is".). Then, if the child repeated the sign correctly while facing the teacher, the teacher prasied him and handed him the material at once.

c) When the child was going to pick up a material directly without asking: The teacher interrupted the child's behavior rapidly and manded. Then, if the child made the sign of the material correctly, while looking toward the teacher, the same procedure as in a) was used, and if the child correctly signed while looking at the material, the procedure in b) was used. If the child failed to respond appropriately, the teacher provided a model for the child to imitate.

d) When the child neither made a sign nor approached a material directly: The teacher exhibited the materials by playing with them or putting some of them in front of the child. Then, if the child responded with an appropriate sign toward the teacher, the same procedure as a) was used; if the child was going to pick up a material directly without asking, the procedure in c) was used; and if the child made the sign while looking toward the material, the b) procedure was used.

The shaping of correct signs was taught by using a simultaneous communication method. When the child could not make the correct sign, the teacher gave manual prompts, that is, the teacher grasped the child's hands and molded them into the appropriate sign configuration. To facilitate the spontaneous use of the acquired signs, the manual prompts were gradually decreased until the child was able to make the sign by himself, and also a time delay procedure was introduced, in which the teacher progressively increased the time before presenting the mand.

Sign language training was conducted for one session per week regularly. Each session lasted approximately 30 minutes; after that, phonetic imitation traning on Japanese vowels (a, i, u, e, o) was held for approximately 10 minutes.

Sign vocabularies: The 16 noun signs to be taught were selected on the basis of several factors, such as high interest to the child, familiarity in the child's environment, iconicity, and ease of signing. The sign vocabulary used was: jūsu (juice), pan (bread), hikōki (airplane), taiko (drum), jidōsha (car), pazuru (puzzle), densha (train), kamera (camera), kukkī (cookie), saru (monkey), bōru (ball), pen (pen), tsumiki (block), denwa (telephone), rappa (trumpet), and hon (book).

A total of 27 sessions was conducted. Half of the materials were introduced in each session randomly.

RESULTS

The following behavioral changes were observed during the experiment:

(1) Changes in each response: Figure 1 shows the changes in the child's spontaneous behaviors, which include signing responses, vocalization, finger-pointing, the child's responses to the teacher's mands, and prompted responses. The Figure shows the data for each response's rate as a percentage of the child's total number of responses.

As training progressed, the child's spontaneous behavior increased little by little, while responses to the teacher's mands decreased.

(2) Changes in response mode: The child's responses to teacher's mands were classified into five modes: response with sign alone, response combining sign with vocalization, response with vocalization alone, response that combined vocalization with finger-pointing, and response with finger-pointing alone. The change in rate of each response mode per session is displayed in Figure 2.

Figure 2 shows that, at the beginning of the training, the rate of response with sign alone was high and that of the other modes was quite low, less than 10%. However, as the sessions went by, the rate of the various response modes changed systematically, that is, first response combining sign with vocalization increased more and more, then response with vocalization alone, and, after that, response that combined finger-pointing with vocalization increased reciprocally.

Figure 3 shows the changes in the rate of each response mode in the child's spontaneous behaviors per session. Although response with vocalization alone occurred at a high rate in the earlier sessions, the changing trend of these responses was similar to that of the child's responses to the teacher's mands, that is, as the sessions went by, response with sign alone decreased progressively, while both response combining sign with vocalization and response with vocalization alone increased more and more, starting with the thirteenth session. Finally, response combining finger-pointing with vocalization predominated.

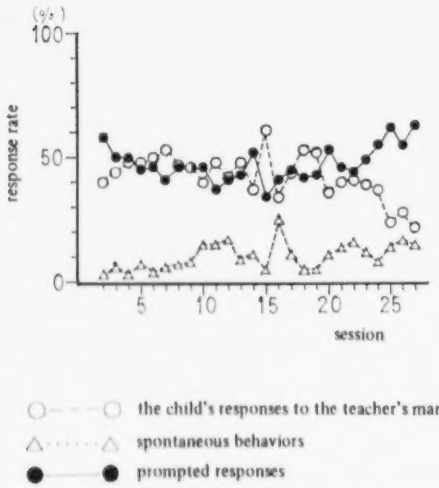

Figure 1. Changes in spontaneous behavior, the child's responses to the teacher's mands, and prompted responses as a proportion of the child's total responses

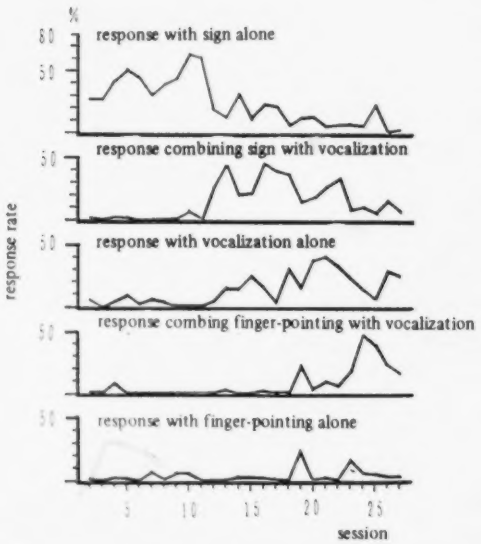

Figure 2. Changes in the rate of each response mode to teacher's mand

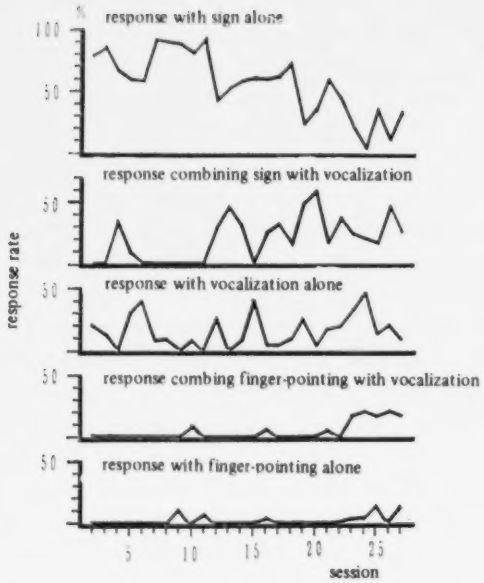

Figure 3. Changes in the rate of each response mode as a proportion of the child's total spontaneous behavior

(3) Correctness of sign configuration: In earlier sessions, many incorrect signs were observed, but by means of prompts and molding, the rate of the child's correct signs increased as training continued. In all sessions, partially correct signs occurred infrequently. Interestingly, almost all signs that occurred spontaneously were nearly perfect from the initial session in which they occurred.

(4) Interaction patterns: The interaction patterns between the child, the materials, and the teacher were classified into several categories. As can be seen from Figure 4, as the teacher gave sign language training, the child came less and less to approach the material directly without signing to the teacher (#1). In contrast, the child's asking the teacher for a material by using a sign or vocalization (#2) increased, and exchanging materials and vocalizations between them also increased (#3).

Along with these tendencies in the interaction patterns, it seemed that the child's play behavior improved, although it was not treated directly as a target behavior.

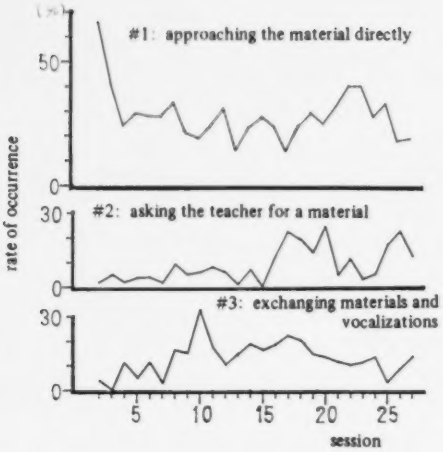
#1: approaching the material directly
#2: asking the teacher for a material
#3: exchanging materials and vocalizations
rate of occurrence
session

Figure 4. Patterns of interaction between the teacher and the child

(5) Phonetic imitation training: As a result of the phonetic imitation training, the child could not only imitate orally all the Japanese vowels, (a, i, u, e, o), some diphthongs (ai, ue, ao), and some three-connected vowels (aiu, ueo), but could also express the correct vocal sounds when the teacher presented the shape of the mouth without any vocalization.

(6) Generalization of acquired signs: Through sign language training, some of the acquired signs, including "jūsu (juice)", "pan (bread)", and "kukkī (cookie)", generalized into the child's daily living environments, and the spontaneous use of these signs was observed very often.

DISCUSSION

(1) Spontaneous use of sign language: Teaching strategies such as those employed in this study of incidental sign language training shows considerable promise for the acquisition and acceleration of the spontaneous use of noun signs acquired.

One of the most important factors in this type of training is arranging the natural environment to increase the opportunities that the child will initiate a

request for assistance to the teacher, and thus provide opportunities for teaching language.

Also, the preselected language targets for teaching should be selected so as to be appropriate for the child's language skill level. In this study, noun signs were selected because it was felt that it would be quite difficult to teach him oral skills as a communication tool.

Whether oral skills or signs were selected for the language target, the method used in this study appeared advantageous, because it operationally cut the behavioral chains already functional in natural environment, and then newly incorporated sign use that behavioral chain. As a result, the spontaneous use of signs will always be naturally reinforced.

Since starting this training program, the child's spontaneous sign use was always signed perfectly correctly. It may be that the acquisition of sign language does not need to progress by small steps.
(2) Shift from sign responses to oral responses: As the sessions went by, already acquired signing responses decreased, while vocal responses increased. These data imply that the child must had have some vocal repertoire before participating in this study, and that the simultaneous method and phonetic imitation training were satisfactorily implemented.

In the later sessions, the child showed increased finger-pointing behavior, that is, an easier response mode than any others, instead of decreasing response with sign alone. It seems that, if two classes of response are functionally equal, the one with the more simple response topography to express requests would be selected.

(3) Changes in interactive behavior: Generally speaking, language behavior functions as interactive behavior. As mentioned before, the interaction patterns between the child and the teacher shifted toward increasing giving and taking behaviors in the training setting. Thus, to use sign language functionally with other people will increase the frequency of interactive behavior and, at the same time, improve its quality. With such plentiful interactive behavior, generalization of acquired language will be facilitated.

(4) Language training in natural environments: If we think that the most important role of language is to communicate with others, we should improve children's communication skills, especially by teaching them how to use language smoothly in daily living situations.

In recent years, many language programs, including those that have an operant conditioning basis, have increasingly tended to teach language-delayed children language skills that are used in each child's living situation. It is said that the most important thing is to analyze thoroughly the child's interaction with other people and with objects in the natural environment from an ecological viewpoint, and then to make a language teaching plan in accordance with this behavior analysis, and to conduct it in the child's daily living situation.

In these situation, including the home, the parents will be involved as intervention agents. Parents could successfully teach their children new language skills through parent training that depends on behavior analytic helping techniques.

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言語発達遅滞児へのサイン言語の指導

東京学芸大学附属特殊教育研究施設

清　水　直　治

行動分析の原理を応用した言語発達遅滞児への言語指導は，これまでその多くが構造化された指導場面での，音声言語の獲得に焦点が当てられてきたが，その結果，反応般化や自発使用の困難性も指摘されるようになった。そこで，日常環境のなかで偶発的に言語を指導するいくつかの方法が開発されるとともに，音声言語の指導に固執することなく，サイン言語などの非音声系の言語をも指導すべきであるとされはじめた。

本研究は，名詞サインの習得や習得した名詞サインの自発使用にとって，マンドーモデル法と時間遅延法の手続きを組み合わせた日常環境のもとで実施する言語訓練の効果を，１名の自閉症男児を対象に検討したものである。

結果をみると，ここで用いた指導法はサイン言語の自発使用を促すうえで有効であるとともに，子供と指導者との相互交渉のパターンがやりとり行動が増加する方向に変化していた。また，指導が進むにつれて，習得したサイン反応が漸減し発声の増加もみられた。

そして，コミュニケーションの手段としての言語の役割を重視するのであれば，日常の生活場面のなかでの円滑な言語使用を指導すべきであることが指摘された。

キーワード：言語発達遅滞児　サイン言語　行動分析　マンドーモデル法　時間遅延法